

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

NEXEON LIMITED,

Plaintiff,

v.

EAGLEPICHER TECHNOLOGIES LLC,  
et al.

Defendants.

Civil Action No. 15-cv-955-RGA

**MEMORANDUM OPINION**

Mary Matterer, MORRIS JAMES LLP, Wilmington, DE; Stephen R. Carden (argued), Ann C. Palma, and James V. Suggs, MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP, Chicago, IL.

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April 25, 2018

  
ANDREWS, U.S. DISTRICT JUDGE:

Presently before the Court is the issue of claim construction of multiple terms in U.S. Patent Nos. 8,940,437 (“the ’437 patent”); 8,597,831 (“the ’831 patent”); and 9,583,762 (“the ’762 patent”).<sup>1</sup> The Court has considered the Parties’ Joint Claim Construction Brief. (Civ. Act. No. 15-cv-915-RGA; D.I. 104). The Court heard oral argument on December 21, 2017. (D.I. 127).

## **I. BACKGROUND**

The asserted patents relate to methods for fabricating silicon-based fibers and particles for use in rechargeable lithium ion batteries.

## **II. LEGAL STANDARD**

“It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (citation omitted). “[T]here is no magic formula or catechism for conducting claim construction.’ Instead, the court is free to attach the appropriate weight to appropriate sources ‘in light of the statutes and policies that inform patent law.’” *SoftView LLC v. Apple Inc.*, 2013 WL 4758195, at \*1 (D. Del. Sept. 4, 2013) (quoting *Phillips*, 415 F.3d at 1324) (alteration in original). When construing patent claims, a court considers the literal language of the claim, the patent specification, and the prosecution history. *Markman v. Westview Instruments*,

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<sup>1</sup> Plaintiff has agreed to withdraw its allegations of infringement of U.S. Pat. No. 8,940,437 (“the ’437 patent”) with respect to Defendants’ products that contain less than 10% silicon-containing SiNANode material. (D.I. D.I. 157 at 4). According to Plaintiff, Defendant OneD is “no longer focusing on the higher levels of SiNANode, such as 32.8% sample provided” to Plaintiff by OneD, and Defendant “EaglePicher is only licensed to make 8% SiNANode.” (*Id.*). Therefore, Plaintiff argues that its offer to dismiss the ’437 patent “with respect to any SiNANode percentage under 10%” removes it from this litigation. (D.I. 157 at 4). Defendants dispute Plaintiff’s recitation of facts. They argue that OneD “will continue research and design work relating to those higher percentages” of SiNANode material, and that EaglePicher’s license agreement “does not limit the Si/C % that EaglePicher can produce.” (D.I. 164-1 at 2).

It is thus not clear to me that Plaintiff’s offer to dismiss the ’437 patent with respect to any SiNANode percentage less than 10% would entirely remove the ’437 patent from the case. Accordingly, I will construe all terms that appear in the ’437 patent.

*Inc.*, 52 F.3d 967, 979-80 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). Of these sources, “the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Phillips*, 415 F.3d at 1315.

“[T]he words of a claim are generally given their ordinary and customary meaning. . . . [This is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1312-13. “[T]he ordinary meaning of a claim term is its meaning to [an] ordinary artisan after reading the entire patent.” *Id.* at 1321. “In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Id.* at 1314.

When a court relies solely upon the intrinsic evidence—the patent claims, the specification, and the prosecution history—the court’s construction is a determination of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015). The court may also make factual findings based upon consideration of extrinsic evidence, which “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Phillips*, 415 F.3d at 1317-19. Extrinsic evidence may assist the court in understanding the underlying technology, the meaning of terms to one skilled in the art, and how the invention works. *Id.* Extrinsic evidence, however, is less reliable and less useful in claim construction than the patent and its prosecution history. *Id.*

“A claim construction is persuasive, not because it follows a certain rule, but because it defines terms in the context of the whole patent.” *Renishaw PLC v. Marposs Societa' per Azioni*,

158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that “a claim interpretation that would exclude the inventor’s device is rarely the correct interpretation.” *Osram GMBH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (citation omitted).

### III. CONSTRUCTION OF DISPUTED TERMS

The asserted patents claim methods for fabricating silicon or silicon-based materials and their use in electrodes in rechargeable lithium ion batteries. Claim 1 of the ’831 patent reads as follows:

1. An electrode for an electrochemical cell, the electrode comprising an *electrically interconnected mass* comprising:

*elongated structures*, wherein the *elongated structures* are capable of being reversibly charged and discharged and at least some of the elongated structures cross over each other to provide *intersections* and a porous structure, and wherein the *elongated structures* comprise silicon;

at least one of a binder and an electronic additive;

wherein the *elongated structures* and the at least one of the binder and the electronic additive cooperate to define a porous composite electrode layer.

(’831 patent, claim 1) (disputed terms italicized).

Claim 17 of the ’762 patent reads as follows:

17. A method of forming a lithium-ion battery electrode, the method comprising:

depositing a plurality of crystalline silicon-comprising elongated elements, the elongated elements being capable of lithium insertion and removal, wherein when deposited *at least some of the elongated elements cross over other elongated elements many times along their length* to form multiple *intersections* thereby forming a porous structure; and

charging the porous structure, wherein the charging *welds* the elongated elements to one another at the intersections by forming amorphous silicon-containing structures between disrupted crystalline structures of the silicon-comprising elongated elements at the intersections.

(’762 patent, claim 17) (disputed terms italicized). Dependent claim 19 of the ’762 patent depends from claim 17 and reads as follows:

19. A method of forming a lithium-ion battery electrode as claimed in claim 17, further comprising:

recharging the lithium-ion battery electrode a plurality of times;

*wherein each of the recharging operations increases the structural strength of the electrode.*

(’762 patent, claim 19) (disputed terms italicized).

Claim 21 of the ’437 patent reads as follows:

21. A plurality of discrete particles wherein each particle comprises silicon and includes a *particle core* and a plurality of *silicon-comprising pillars* extending outwardly therefrom from a first end to a second end, wherein each pillar in the plurality of pillars is attached to the core at the first end of the pillar, and the second end of each pillar is an unattached free end, wherein in each particle, the fraction of the surface area of the particle core occupied by the pillars is in the range of 0.10 to 0.50.

(’437 patent, claim 21) (disputed terms italicized). Dependent claim 22 of the ’437 patent depends from claim 21 and reads as follows:

22. A plurality of discrete particles as claimed in claim 21 wherein the pillars are *integral with the core*.

(’437 patent, claim 22) (disputed terms italicized).

**1. “electrically interconnected mass” (’831 patent, all asserted claims)**

a. *Plaintiff’s proposed construction*: “electrically interconnected mass”

b. *Defendants’ proposed construction*: Indefinite.

If construed, “a mass of interconnected elongated structures that allows the flow of electrons through their contact points.”

c. *Court’s construction*: plain and ordinary meaning

The asserted claims of the '831 patent define an “electrically interconnected mass” to include “elongated structures.” (*See, e.g.*, '831 patent at claim 1). At oral argument, Plaintiff offered a second proposed construction of “electrically interconnected mass” to mean “a mass that has electrical connections throughout.” (D.I. 127 at 11:13-19, 20:1-3; D.I. 85 at 2).

Plaintiff asserts that since “[a] POSA reading the '831 patent would readily comprehend the term electrically interconnected mass to mean a unified body that has internal electrical connections throughout,” the term should be given its plain and ordinary meaning. (D.I. 104, p. 2). As support, Plaintiff cites language in claim 1 of the '831 patent that describes the “electrically interconnected mass” as being comprised of “elongated structures, wherein the elongated structures are capable of being reversibly charged and discharged and at least some of the elongated structures cross over each other to provide intersections and a porous structure.” (*Id.* (citing '831 patent, claim 1)). Plaintiff further urges that “Figure 2 also depicts a mass comprising interconnected elongated structures.” (*Id.*). Additionally, Plaintiff notes that the specification describes the elongated structures as “long thin fibres which crossover to provide multiple intersections . . . to [reduce] the problem of charge/discharge capacity loss.” ('831 patent at 3:4-9). To the extent that this term requires construction, Plaintiff cautions against importing additional limitations into claim 1 in light of the open-ended “comprising” language used in the claims. (D.I. 104, p. 3).

Assuming the term is not indefinite, Defendants urge that the prosecution history supports what they characterize as a clarifying construction. (*Id.* p. 6). Specifically, Defendants point to Plaintiff's statement that “the present application solves the problem of electrical isolation by providing a plurality of the silicon-comprising elongated elements wherein at least some of the elements cross over each other to provide multiple intersections thereby defining a porous

structure.” (*Id.* pp. 5-6 (citing D.I. 85 at 619)). In other words, Defendant argues, “the problem of electrical isolation is solved through electrically interconnecting the elongated elements through their contact points.” (*Id.* p. 7). This is consistent, Defendants argue, with lithiation, which requires the flow of electrons. (*Id.* (citing Resp. Ex. G)).

Plaintiff opposes Defendants’ construction because it would limit the meaning of the term to refer only to the flow of electrons through the contact points, when the claims as drafted encompass a broader meaning, as demonstrated by the “comprising” language in the claims. (*Id.* pp. 9-10). According to Plaintiff, the use of “electronic additives” also does not limit the electrical connections to the contact points of the elongated structures as Defendants’ proposed construction would require. (*Id.* p. 9).

At oral argument, Defendants conceded that electrical connections are not limited to connections between contact points of the elongated structures. (D.I. 127 at 23:10-12 (“There can be an electrical connection via an electronic additive to the elongated structure.”)). Defendants assert, however, that such connections “would not be electrical interconnections.” (*Id.*). During oral argument, Defendants stated that their primary issue with Plaintiff’s proposed construction is that it substitutes “connected” for “interconnected” when the terms have distinct meanings. (*Id.* at 20:1-21:13).

Construing “electrically interconnected mass” to have its plain and ordinary meaning addresses Defendants’ concerns with Plaintiff’s proposed construction because it retains “interconnected.” I find that the claim language defining “electrically interconnected mass” using a “comprising” term also supports a plain and ordinary meaning construction. Therefore, I construe “electrically interconnected mass” to have its plain and ordinary meaning.

**2. “elongated structures” (’831 patent, all asserted claims)**

- a. *Plaintiff’s proposed construction*: plain and ordinary meaning: “an elongated structure is one that is longer than it is wide”
- b. *Defendants’ proposed construction*: “fibres having a transverse dimension less than 500 nm”
- c. *Court’s construction*:  
“elongated structure”: “a long, thin structure with a submicron width”  
“elongated structures”: “more than one elongated structure”

During oral argument, the parties agreed to construe “elongated structure” as “a long, thin structure with a submicron width.” (D.I. 127 at 77:24-78:7). I construe “elongated structures” to mean “more than one elongated structure.”

**3. “capable of being reversibly charged and discharged”**

- a. *Plaintiff’s proposed construction*: plain and ordinary meaning
- b. *Defendants’ proposed construction*: indefinite
- c. *Court’s construction*: plain and ordinary meaning

Pursuant to my oral order (D.I. 126), I adopt Plaintiff’s construction for this term. Defendants may argue the indefiniteness of this term at the summary judgment stage.

**4. “at least some of the elongated structures cross over other elongated elements many times along their length” (’762 patent, claims 1, 10, 17)**

- a. *Plaintiff’s proposed construction*: plain and ordinary meaning
- b. *Defendants’ proposed construction*: indefinite

If construed: “Each elongated element crosses over and contacts with other elongated elements over the length of each of the other elongated elements, forming a felt-like or mat-like structure prior to charging”

- c. *Court’s construction*: “prior to charging, at least some of the elongated structures cross over other elongated elements many times along their length”



A similar term, “at least some of the elongated structures cross over each other,” appears in claim 1 of the ’831 patent. (D.I. 104, p. 21).

Plaintiff argues that the term has a readily-accessible plain meaning, and Defendants’ construction improperly limits the claim language to preferred embodiments in the specification. (*Id.* pp. 21-22). For example, Defendants’ proposed construction adds a limitation that the elongated structures “form[] a felt-like or mat-like structure prior to charging” limitation. (*Id.* p. 22). Additionally, Plaintiff asserts that Defendants’ construction re-writes the claim language “some,” which allows for the inclusion of less than all structures or elements, to “each,” which requires the inclusion of all structures or elements. (*Id.*). Even if a felt-like structure were required, Plaintiff argues that Defendants provide “no explanation or evidence for why such a structure would require each elongated element to cross [over] other elements.” (*Id.* p. 28 (emphasis omitted)). There is no statement in the specification that “each fiber must cross over other fibres to accomplish a stated goal,” so there is no reason to import such a limitation into the claims. (*Id.* p. 29). According to Plaintiff, Defendants’ citation to the prosecution history does not provide support for importing an “each” limitation into the construction because its context is a discussion of the meaning of crossing over to form intersections, not the meaning of “at least some” or “each.” (D.I. 127 at 54:6-14). Finally, Plaintiff argues that “their” in this term refers back to “at least some elongated structures.” (*Id.* at 42:17-20). Therefore, Plaintiff urges me to adopt the plain and ordinary meaning of some, which permissibly includes, but does not require, the inclusion of each structure or element.

Assuming that the court determines that the term is not indefinite, Defendants urge adoption of their proposed construction, because the ’831 patent “repeatedly explains that each fiber contacts other fibers many times, forming a felt-like structure prior to charging.” (D.I. 104,

pp. 22-23 (citing '831 patent at 2:42-50, 3:4-9, 3:10-15, 3:12-19, 5:22-28, 4:33-36)). Defendants also point to the '831 patent's disclosure that "the invention allows creation of fibres or hairs of silicon or silicon-based material and the use of these fibres to create both a composite anode structure with a polymer binder, an electrode additive (if required) and a metal foil current collector and a felt-like electrode structure." ('831 patent at 2:63-67). Finally, Defendants argue that the prosecution history supports imposing a "prior to charging" limitation because Plaintiff distinguished the claimed invention from the prior art on the basis that the prior art did not discuss "the arrangement of the nanowires prior to charging." (D.I. 104, pp. 23-24 (citing D.I. 85 at 174, 179)). Defendants also note that they do not argue that the felt-like or mat-like structure disappears after charging (*Id.* pp. 29-30), and that Plaintiff admitted that "the initial arrangement occurs prior to charging" (*Id.* p. 30).

First, I see no reason to re-write the claim language from "at least some" to "each." Defendants' citations to the patent refer to preferred embodiments or portions of the patent using permissive language, rather than portions of the patent describing the invention as a whole. I am not convinced that the prosecution history cited by Defendants constitutes a disavowal of claim scope. Second, I decline to import a felt-like or mat-like limitation into this claim term. The '762 patent discusses "felt-like structure" using permissive language.<sup>2</sup> (*See, e.g.*, '762 patent at 3:1-5 ("the invention allows . . . the use of these fibers to create . . . a felt-like electrode structure)).

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<sup>2</sup> Neither the specification of the '762 patent nor the specification of the '831 patent uses the term "mat-like." The '762 specification twice mentions the word "mat." First, in discussing the anode electrode structure, the '762 specification states, "By providing a dis-ordered non-woven mat of fibres, a fully reversible and repeatable charging capability is introduced without risk of significant mechanical isolation." ('762 patent at 2:48-51). Second, discussing the fabrication of a composite anode, the specification states, "The resulting mat or composite film has a porous and/or felt-like structure in which the mass of silicon fibres is typically between 70 percent and 95 percent." (*Id.* at 4:40-42). The '831 specification contains the same recitations. ('831 patent at 2:44-46, 4:32-35). The parties did not argue any material difference between felt-like and mat-like. (*See* D.I. 104, pp. 21-31; *see generally* D.I. 127). The examples in the specification appear to use "mat" and "film" interchangeably and appear to describe the "mat" or "film" as a "felt-like structure." I therefore find that there is no material difference between "felt-like" and "mat-like."

Additionally, the doctrine of claim differentiation counsels against importing a felt-like limitation into this claim term. Independent claim 1 of the '762 patent contains the disputed term. Dependent claim 18 of the '762 patent claims the method of "claim 1, wherein the porous structure is a felt or felt-like structure."<sup>3</sup> Construing the disputed term to include a felt-like structure limitation would render the sole additional limitation in claim 18 superfluous. *See Phillips*, 415 F.3d at 1315 ("[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim."). Third, I find warranted the limitation that the initial arrangement of elongated structures forms prior to charging. Plaintiff agrees that the initial arrangement occurs prior to charging, but disagrees with any construction that imposes the limitation that the initial arrangement is not maintained after charging. (D.I. 127 at 53:1-11). Defendants do not dispute that the initial arrangement continues to exist after charging. (*Id.* at 57:7-12). Therefore, I will construe this term to mean "prior to charging, at least some of the elongated structures cross over other elongated elements many times along their length." This construction does not imply that this initial arrangement of elongated structures disappears after charging.

**5. "Intersections" ('831 patent, all asserted claims; '762 patent, all asserted claims)**

a. *Plaintiff's proposed construction*: "Intersections"

b. *Defendants' proposed construction*: Indefinite

If construed, "Points or area of contact (i.e., touching) prior to charging"

c. *Court's construction*: "Points or area of contact formed prior to charging"

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<sup>3</sup> The term "mat-like" is not contained in any of the independent claims. Having concluded that claim differentiation counsels against the addition of a "felt-like" limitation, and that there is no material difference between "felt-like" and "mat-like," I decline to import a "mat-like" limitation into this term.

Plaintiff argues that “intersections” has a readily apparent ordinary meaning, rendering further construction unnecessary. (D.I. 104, p. 31). According to Plaintiff, in the context of this patent, the ordinary meaning clearly “refers to the points or areas where the elongated structures or elements cross over and directly contact each other.” (*Id.*). As support, Plaintiff cites the specification’s reference to “a plurality of elongate or long thin fibres which crossover to provide multiple intersections.” (*Id.*; ’831 patent at 3:4-6).

Defendants agree that “intersections” refer to points or areas of contact and respond that intersections should include the “prior to charging” limitation for the same reasons already recited with respect to the fourth disputed term. (D.I. 104, p. 32).

During oral argument Plaintiff agreed that intersections are formed prior to charging. (D.I. 127 at 51:15-17, 56:18-23). Plaintiff disagrees with any construction, however, that implies that intersections disappear after charging. (*Id.* at 53:1-11). Defendants do not dispute that intersections continue to exist after charging. (*Id.* at 57:7-12). Therefore, I will construe “intersections” to mean “points or area of contact formed prior to charging.”

**6. “wherein charging welds” (’762 patent, claims 1 and 17)**

**“Charging the porous structure, which welds” (’762 patent, claim 10)**

- a. *Plaintiff’s proposed construction:* plain and ordinary meaning
- b. *Defendants’ proposed construction:* indefinite
- c. *Court’s construction:* plain and ordinary meaning

Pursuant to my oral order (D.I. 126), I adopt Plaintiff’s construction for this term. Defendants may argue the indefiniteness of this term at the summary judgment stage.

7. **“Wherein each of the recharging operations increases the structural strength of the electrode” (’762 patent, claim 19)**

- a. *Plaintiff’s proposed construction:* plain and ordinary meaning
- b. *Defendants’ proposed construction:* indefinite
- c. *Court’s construction:* plain and ordinary meaning

Pursuant to my oral order (D.I. 126), I adopt Plaintiff’s construction for this term.

Defendants may argue the indefiniteness of this term at the summary judgment stage.

8. **“Particle core”**

- a. *Plaintiff’s proposed construction:* plain and ordinary meaning
- b. *Defendants’ proposed construction:* “The portion of a mono- or poly-crystalline particle that supports the etched silicon-comprising pillars”
- c. *Court’s construction:*

This term appears in all asserted claims of the ’437 patent. (D.I. 10, p. 58). The parties agree that the particle core is the portion of the pillared particles to which the pillars are attached. (*Id.* p. 62).

Plaintiff asserts that the meaning of this term is clear from the claim language and thus requires no construction. (*Id.* p. 58). According to Plaintiff, the claims make clear that, “The particle core is the central part of the particle from which the pillars extend.” (*Id.*). As support, Plaintiff offers a general purpose dictionary definition of “core” as “the central or innermost part” of an item. (*Id.* (citing Opening Ex. B at 407)). Plaintiff urges that Defendants’ proposed construction impermissibly imports limitations present in neither the claims nor the specification. (*Id.*). First, Plaintiff maintains that “there is no explicit basis for a ‘portion’ of a particle that ‘supports’ the silicon comprising pillars in the intrinsic evidence, whereas there is explicit support for a particle ‘core.’” (*Id.* (citing ’437 patent at 7:25-29)). Second, Plaintiff argues there is no

reason to import a limitation into the claims that the particle is mono- or poly-crystalline, since “such a feature is only one of several possible features of the particles described in the intrinsic evidence.” (*Id.*). Third, Plaintiff asserts that Defendants’ proposed construction “improperly limit[s] the claimed particles to etched silicon-comprising pillars,” when the patent does not require such a limitation. (*Id.* p. 59). Specifically, Plaintiff argues that the patent discloses that “the pillars can be created by chemical reaction etching or galvanic etching,” employing permissive, rather than mandatory, language to describe the pillar creation process. (’437 patent at 3:57-61).

First, Defendants counter that the ’437 patent “makes clear that each particle has two portions: the particle core and the pillars.” (D.I. 104, p. 60 (citing ’437 patent at 3:35-37 (“The first aspect of the invention provides a particle comprising silicon having a particle core and an array of silicon-comprising pillars extending therefrom.”))). Defendants note that, “The claims specify that one end of each pillar is attached to the particle core and the other end is free.” (*Id.*). Therefore, Defendants argue, “the particle core supports the pillars,” and Defendants’ proposed construction “provides clarity by defining the structural relationship between the particle core and the pillars.” (*Id.*). Second, Defendants assert that since the specification does not describe particles with any structure other than crystalline structure, “the intrinsic evidence requires the particle core to be part of a mono- or poly-crystalline particle.” (*Id.*). Third, Defendant contends that the patent “requires the particle core to support pillars that are etched.” (*Id.* p. 61 (citing ’437 patent at 3:54-61)). Since the patent discloses replacing graphite with silicon in the lithium battery as a way to achieve the stated goal of “increase in stored energy per unit mass and per unit volume,” Defendant argues, “The claim should not be construed to cover a graphite particle core with silicon pillars.” (D.I. 127 at 66:8-25; (citing ’437 patent at 2:2-5)). As support, Defendants submit that the patent

discloses no other method for creating pillars, and cites Plaintiff's Preliminary response in an IPR proceeding on the '437 patent, in which Plaintiff "presented arguments limiting the scope of the claims to *etched* pillared particles." (D.I. 104, p.61 (citing Response Ex. I at 8-9, 17) (emphasis in original)).

According to Plaintiff, Defendants' citation to Plaintiff's IPR response is disingenuous because placing Plaintiff's arguments in context clarifies that Plaintiff was not arguing that metal etching is the only method to create silicon nanowires. (*Id.* p. 63). Therefore, Plaintiff argues, its IPR response was not a clear disclaimer. (*Id.*).

I agree with Plaintiff that this term should be given its plain and ordinary meaning. First, I find that the patent does not provide a basis to distinguish different "portions" of the particle core, and that the language of claim 18 of the '437 patent adequately explains the relationship between the particle core and the pillars. Second, I see no reason to import a mono- or poly-crystalline limitation into the claims, as Defendants' mono- or poly-crystalline limitation appears to be an attempt to limit the claims to a preferred embodiment. The references to "crystalline" in the patent are in the context of preferred embodiments. ('437 patent at 5:24-26, 9:3-7). Additionally, the '437 patent uses the permissive language that the particle "may be crystalline" rather than stating that the particle "is" or "must be" crystalline. (*Id.* at 9:3-7). Third, I am not persuaded Plaintiff has disclaimed all pillars that are not etched, or that the "particle core" excludes graphite. Claims 1 and 18 of the '437 patent recite "a silicon-comprising particle core," and "each particle compris[ing] silicon and include[ing] a particle core," respectively. (*Id.*, claims 1, 18). "Comprising" is a term of inclusion and does not limit the term it modifies to what is disclosed. Defendants also conceded during oral argument that replacing most of the graphite in an electrode with silicon "would improve the capacity of the electrode" in accordance with a stated goal of the

'437 patent. (D.I. 127 at 72:13-24). In other words, a particle core could contain graphite and still meet the stated goals of the invention. Accordingly, I will construe "particle core" to have its plain and ordinary meaning.

**9. "silicon comprising pillars"**

- a. *Plaintiff's proposed construction*: plain and ordinary meaning
- b. *Defendants' proposed construction*: "pillars etched from a mono- or poly-crystalline silicon particle"
- c. *Court's construction*: plain and ordinary meaning

This term appears in all asserted claims of the '437 patent. (D.I. 104, p. 59). Plaintiff urges that no construction is necessary, because the term clearly refers to "pillars extending outwardly from the particle core" that include silicon. (*Id.*). As support, Plaintiff offers several citations to the '437 patent that use permissive language when referring to silicon pillars. (*Id.* pp. 59-60 (citing '437 patent at 3:57-61, 6:25-28, 8:49-50, 9:3-7)). According to Plaintiff, Defendants' proposed construction constitutes an improper attempt to "limit the claims to etching on a particular type of silicon particle." (*Id.* p. 59). Therefore, for the same reasons as the eighth disputed term, Plaintiff argues that I should adopt its proposed construction. (*Id.*).

Defendants respond that "the intrinsic evidence requires the particle core to be part of a mono- or poly-crystalline particle because the specification only describes the particles as having a crystalline structure." (*Id.* p. 60). Similarly, Defendants argue, "The '437 only teaches that the pillars are formed by etching," and "[t]he specification does not suggest, either explicitly or implicitly, any other way of making the pillars." (*Id.* p. 61).

For the same reasons discussed above with respect to the term "particle core," I will adopt a plain and ordinary meaning construction for "silicon comprising pillars."



**10. “Integral with the core”**

- a. *Plaintiff's proposed construction*: plain and ordinary meaning
- b. *Defendants' proposed construction*: indefinite
- c. *Court's construction*: plain and ordinary meaning

Pursuant to my oral order (D.I. 126), I adopt Plaintiff's construction for this term. Defendants may argue the indefiniteness of this term at the summary judgment stage.

**IV. CONCLUSION**

Within five days the parties shall submit a proposed order consistent with this Memorandum Opinion suitable for submission to the jury.